Performance Assessment Task

Sewing
Grade 6

The task challenges a student to demonstrate understanding of the relationship between fractions, decimals, and percents. A student must make sense of constraints in a word problem. A student must be able to flexibly determine equivalent fractions, decimals and percents. A student must accurately compute with decimals in a real-world context. A student must understand the meaning of remainders in a real-world situation.

Common Core State Standards Math - Content Standards

The Number System

Compute fluently with multi-digit numbers and find common factors and multiples.

6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Ratios and Proportional Relationships

Understand ratio concepts and use ratio reasoning to solve problems.

6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., reasoning about tables of equivalent rations, tape diagrams, double number line diagrams, or equations.

c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

Common Core State Standards Math – Standards of Mathematical Practice

MP.5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

MP.6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Assessment Results

This task was developed by the Mathematics Assessment Resource Service and administered as part of a national, normed math assessment. For comparison purposes, teachers may be interested in the results of the national assessment, including the total points possible for the task, the number of core points, and the percent of students that scored at standard on the task. Related materials, including the scoring rubric, student work, and discussions of student understandings and misconceptions on

the task, are included in the task packet.				
Grade Level	Year	Total Points	Core Points	% At Standard
6	2009	10	5	56 %

Sewing

This problem gives you the chance to:
• use mathematics in a real life situation

Amy is sewing some pants for herself.

This is the rule for how much fabric she needs to buy.

• Measure from your waist to the finished length of the pants
• Double this measurement
• Add 8 inches

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

   How many inches of fabric does she need? _____

2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
   The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

   How much fabric must Amy buy for the pants? _____

3. Chris is also making some pants for herself.
   She buys fabric, thread, buttons and a zipper.
   Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	
2 spools thread at 35¢ a spool	
3 buttons at 25¢ each	
Zipper 60¢	
Total before sales tax	
Sales tax at 8% (round this to nearest cent)	
Total	

10

Sewing	Rubric	
The core elements of performance required by this task are: • use mathematics in a real situation Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **78** inches	1	1
2. Gives correct answer: **$2^{1}/_{4}$** yards *Partial credit* $2^{1}/_{6}$ or 2 yards 6 inches	2ft (1)	2
3. 2 $^{1}/_{4}$ yards of fabric at \$5: **\$11.25** Thread: **\$0.70** Buttons: **\$0.75** (Zipper **\$0.60**) Total before tax: **\$13.30** 8% sales tax: **\$1.06** *Partial credit* Not rounded (1.064) Total: **\$14.36**	1 1 1 1ft 2ft (1) 1ft	7
Total Points		**10**

Sewing

Work the task and look at the rubric. What are the big mathematical ideas in this task?

Look at student work on part 1, using the rule to find the length of fabric needed for the pants. How many of your students put:

78 in.	43 in.	280 in.	4 1/2 in.	Other

How might students get some of these other answers?

Now look at student work on converting inches to yards. What do you think your students understand about measurement and conversions? How many of your students put: *(answers varied from 1/3 to 1115 yards)*

2 1/4	2 1/6	61	2 1/2	1 1/4	Other

What opportunities do students have to analyze and develop the logic of conversions?

Did you see any evidence of students comparing the extra 6 inches to see if it was more or less than 1/4 yard?

Now look at the student work on find the cost of 2 1/4 yards.

$11.25	$5	$10.25	$15	$10	No Response	Other

What made this calculation difficult for them? What didn't they understand?

Now look at student work for the finding the cost of the thread and the buttons. How many of your students:

- Could calculate correctly and put the answer in decimal form?_____
- Could calculate correctly and left the answer in cent form?_____
- Didn't recognize the need to multiply (*35 cents and 25 cents*)?_____
- Misunderstood the units? (*$70 and $75)*?_____

Now look at student work on finding the tax. How many of your students put:

- $1.06?_____
- $1.10?_____
- No tax?_____
- $0.80?_____
- $0.08?_____
- Number the same as their total before tax?_____
- Number larger than their total before tax?_____

What are some of the underlying misconceptions resulting in these errors?

What are expectations for students around calculations with percents at this grade level?

What were some of the errors based on rounding?

Looking at Student Work on Sewing

Student A is able to use the rule to find the length of the pants in inches and convert that to yards. The student can round to the nearest quarter-yard, but doesn't show the rounding. The student uses multiplication of fractions to find the cost of fabric and works with decimals to calculate tax and total.

Student A

- Measure from your waist to the finished length of the pants
- Double this measurement
- Add 8 inches

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

   How many inches of fabric does she need? 78 inches ✓

   35 × 2 = 70 ✓1 ; 70 + 8 = 78 — 1

2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
   The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

   How much fabric must Amy buy for the pants? two and one quarter yards ✓

   36 (two yards) + 36 = 72 ✓2 — 2

   78 − 72 = 6

3. Chris is also making some pants for herself.
   She buys fabric, thread, buttons and a zipper.
   Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	$11.25 ✓
2 spools thread at 35¢ a spool	70¢ ✓
3 buttons at 25¢ each	75¢ ✓
Zipper 60¢	60¢
Total before sales tax	$13.30 ✓
Sales tax at 8% (round this to nearest cent)	$1.06 ✓
Total	14.36 ✓

$2\frac{1}{4} = \frac{9}{4} \times \frac{5}{1} \quad \frac{45}{4}$

$\frac{45}{4} = 11.25$

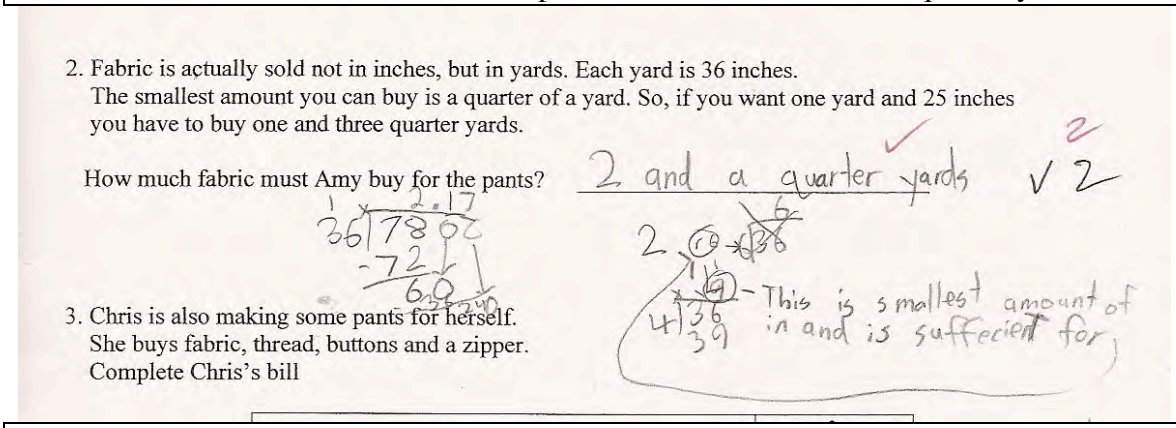
11.25 + .70 + .75 + .60 = 13.30 — 1 1 1 1

13.30 + 1.06 = 14.36 — 1 2 1

13.30 × .08 = 1.0640 (1064 ¢)

10

The student below shows the actual comparison of the 6 inches to the quarter-yard.



2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

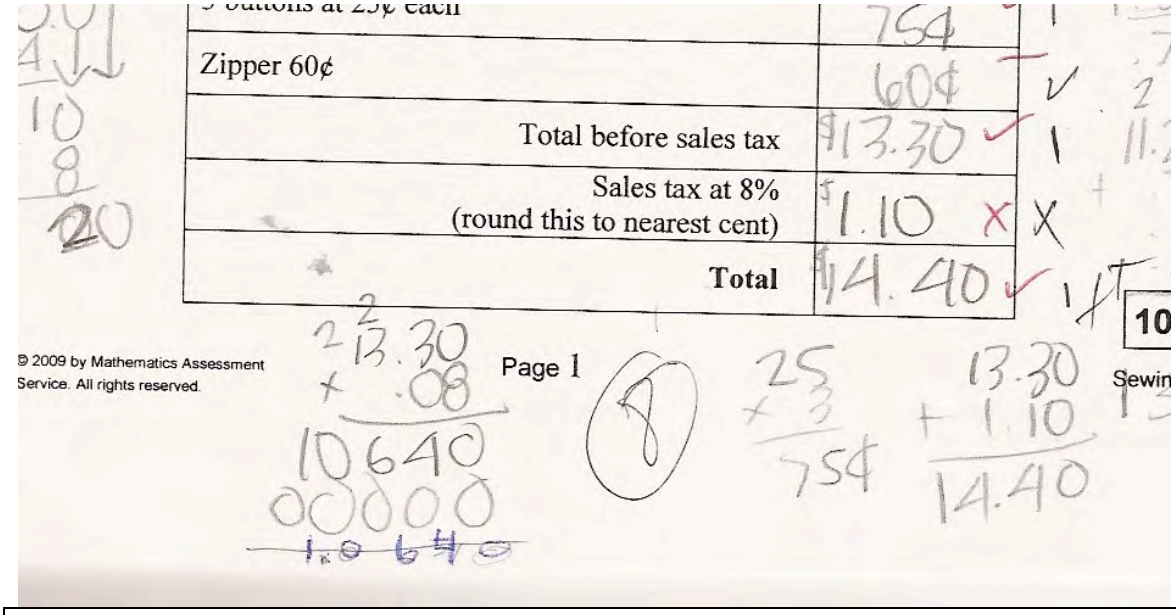
How much fabric must Amy buy for the pants? 2 and a quarter yards

This is smallest amount of in and is suffecient for

3. Chris is also making some pants for herself.
She buys fabric, thread, buttons and a zipper.
Complete Chris's bill

Student B struggled with the idea of rounding to the nearest cent. *How has this student actually rounded?*

Student B



Zipper 60¢	60¢
Total before sales tax	$13.30
Sales tax at 8% (round this to nearest cent)	$1.10
Total	$14.40

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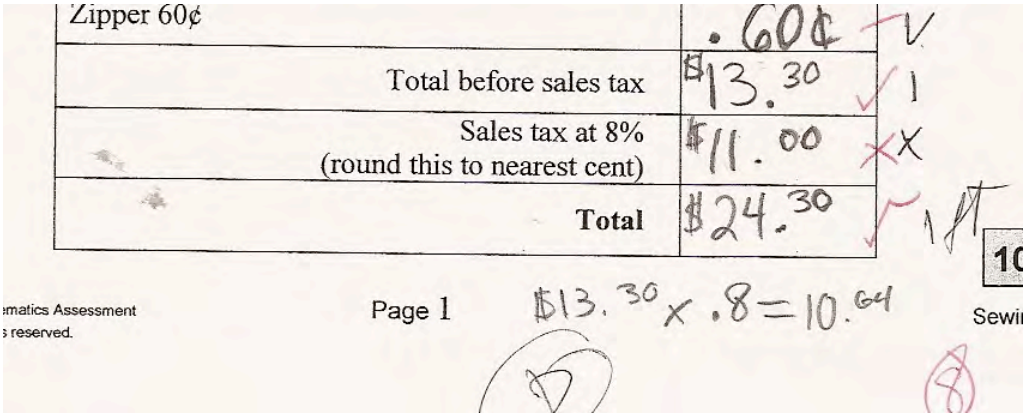
Student C struggles with decimals and percents. *Is $11 a reasonable amount for tax? What error has the student made?*

Student C



Zipper 60¢	.60¢
Total before sales tax	$13.30
Sales tax at 8% (round this to nearest cent)	$11.00
Total	$24.30

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$13.30 x .8 = 10.64

Now look at the work of Student D. *What error does this student make?*

Student D

Mrs S Bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	$10.25
2 spools thread at 35¢ a spool	.70¢
3 buttons at 25¢ each	.75¢
Zipper 60¢	.60¢
Total before sales tax	$12.30
Sales tax at 8% (round this to nearest cent)	$0.08
Total	$12.38

Student E is able to convert the measurements from inches to yards and inches, but doesn't understand the idea of rounding to quarter-yards. The student doesn't use standard money notation. But look at the size of the tax. *Is this reasonable? Why or why not?*

Student E

Amy is sewing some pants for herself.

This is the rule for how much fabric she needs to buy.

- Measure from your waist to the finished length of the pants
- Double this measurement
- Add 8 inches

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

   How many inches of fabric does she need? 78in.

2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
   The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

   How much fabric must Amy buy for the pants? 2 yrd. 6 in.

3. Chris is also making some pants for herself.
   She buys fabric, thread, buttons and a zipper.
   Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	$11.25
2 spools thread at 35¢ a spool	.70¢
3 buttons at 25¢ each	.75¢
Zipper 60¢	.60¢
Total before sales tax	$14.30
Sales tax at 8% (round this to nearest cent)	$16.37
Total	$30.67

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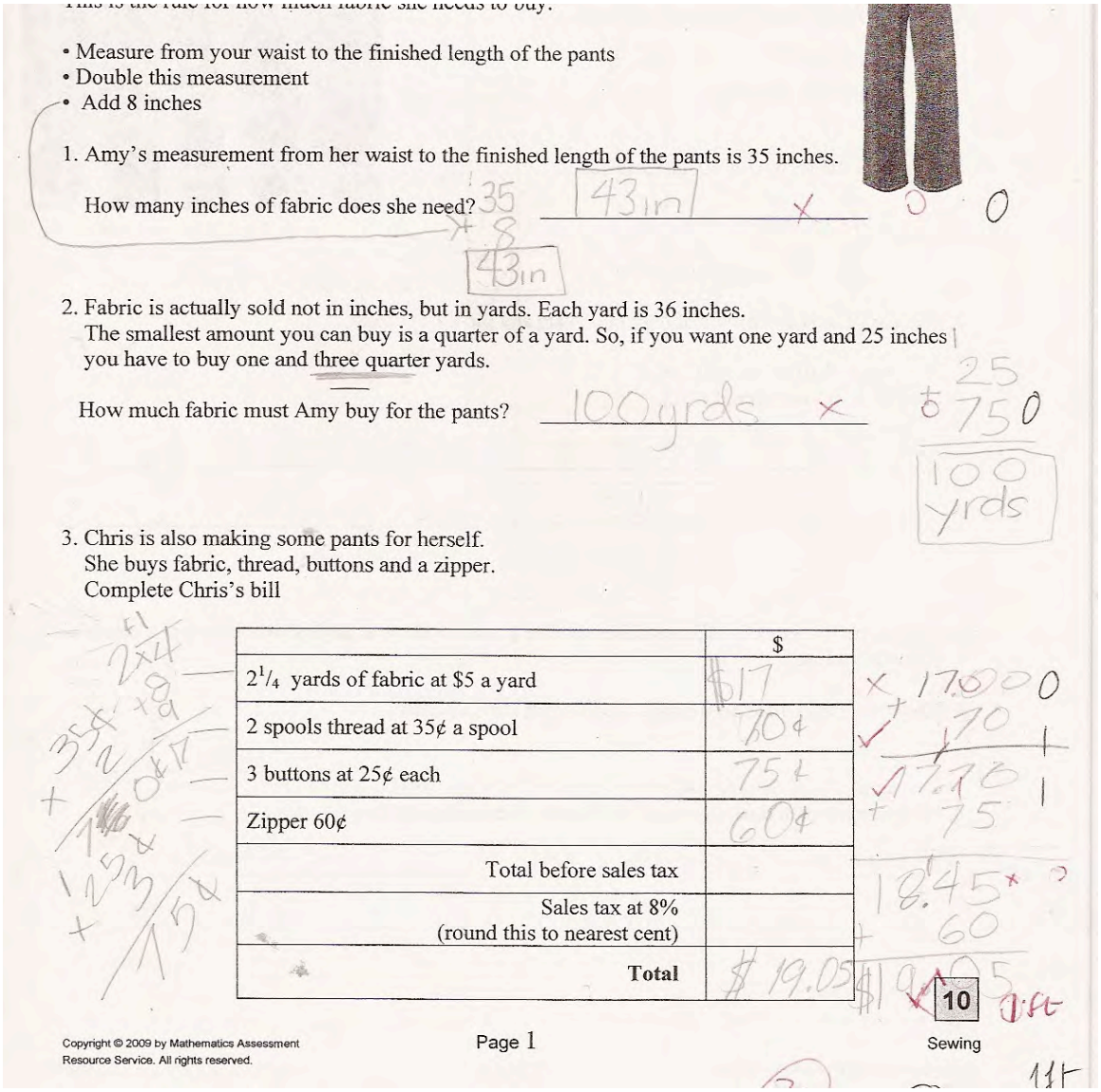
Sewing

Student F does not understand the rule in part 1. *Can you figure out where the 75 comes from in part 2?* The student uses some partially correct ideas about mixed numbers and then ???? to find the cost of the fabric. This student ignores the idea of tax.

Student F



- Measure from your waist to the finished length of the pants
- Double this measurement
- Add 8 inches

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

   How many inches of fabric does she need? 43in

2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
   The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

   How much fabric must Amy buy for the pants? 100yrds

3. Chris is also making some pants for herself.
   She buys fabric, thread, buttons and a zipper.
   Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	$17
2 spools thread at 35¢ a spool	70¢
3 buttons at 25¢ each	75¢
Zipper 60¢	60¢
Total before sales tax	
Sales tax at 8% (round this to nearest cent)	
Total	$ 19.05

10

Student G has struggles with calculations. Notice that the student does not understand the units of money notation and/or decimals in combining costs to find the total before tax.
What might be your next steps with this student?

Student G

Amy is sewing some pants for herself.

This is the rule for how much fabric she needs to buy.

- Measure from your waist to the finished length of the pants
- Double this measurement
- Add 8 inches

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

   How many inches of fabric does she need? 44 inches

2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
   The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

   How much fabric must Amy buy for the pants? three and two quarter yards

3. Chris is also making some pants for herself.
   She buys fabric, thread, buttons and a zipper.
   Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	$10
2 spools thread at 35¢ a spool	70¢
3 buttons at 25¢ each	75¢
Zipper 60¢	60¢
Total before sales tax	$21
Sales tax at 8% (round this to nearest cent)	48¢
Total	$69

10

Student H does not understand the rule in part 1 or two. Notice how unreasonable the amount of tax is in part 3. Look closely at the work at the bottom for calculating tax. *What does the student know about finding a percent? What errors does the student make in trying to use this procedure?*

Student H

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

   How many inches of fabric does she need? 25 inches X 0

1) 100 | 35 → 0.35 ; 350 / 300 / 50

2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
   The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

   How much fabric must Amy buy for the pants? 1/3 quarter yards. X 0

2)

3. Chris is also making some pants for herself.
   She buys fabric, thread, buttons and a zipper.
   Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	$5.00 X 0
2 spools thread at 35¢ a spool	35¢ X 0
3 buttons at 25¢ each	25¢ X 0
Zipper 60¢	60¢ ✓
Total before sales tax	$6.20 ✓ 1pt
Sales tax at 8% (round this to nearest cent)	$40.96 X 0
Total	$40.97 X 0

10

Sewing

1

3) 35¢ + 25¢ + 60¢ − 60¢ = $1.20 ; $5.00 + $1.20 = $6.20

8/100 × $6.20 ; 620 × 8 = 4960

100 | 49600 → 40.96 → +1 = $40.97 ; −400 ; 960 ; −900 ; 600

Student I struggles with choosing even basic operations for part 1. The student also seems confused by the columns in the table. At first it appears that the student didn't recognize the need for multiplication, but there is a new column to the right that might show multiplication. *What does this student need the most? How would you help this student?*

Student I

Sewing

This problem gives you the chance to:
- use mathematics in a real life situation

Amy is sewing some pants for herself.

This is the rule for how much fabric she needs to buy.

- Measure from your waist to the finished length of the pants
- Double this measurement
- Add 8 inches

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

   How many inches of fabric does she need? 28 fabric

2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
   The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

   How much fabric must Amy buy for the pants?

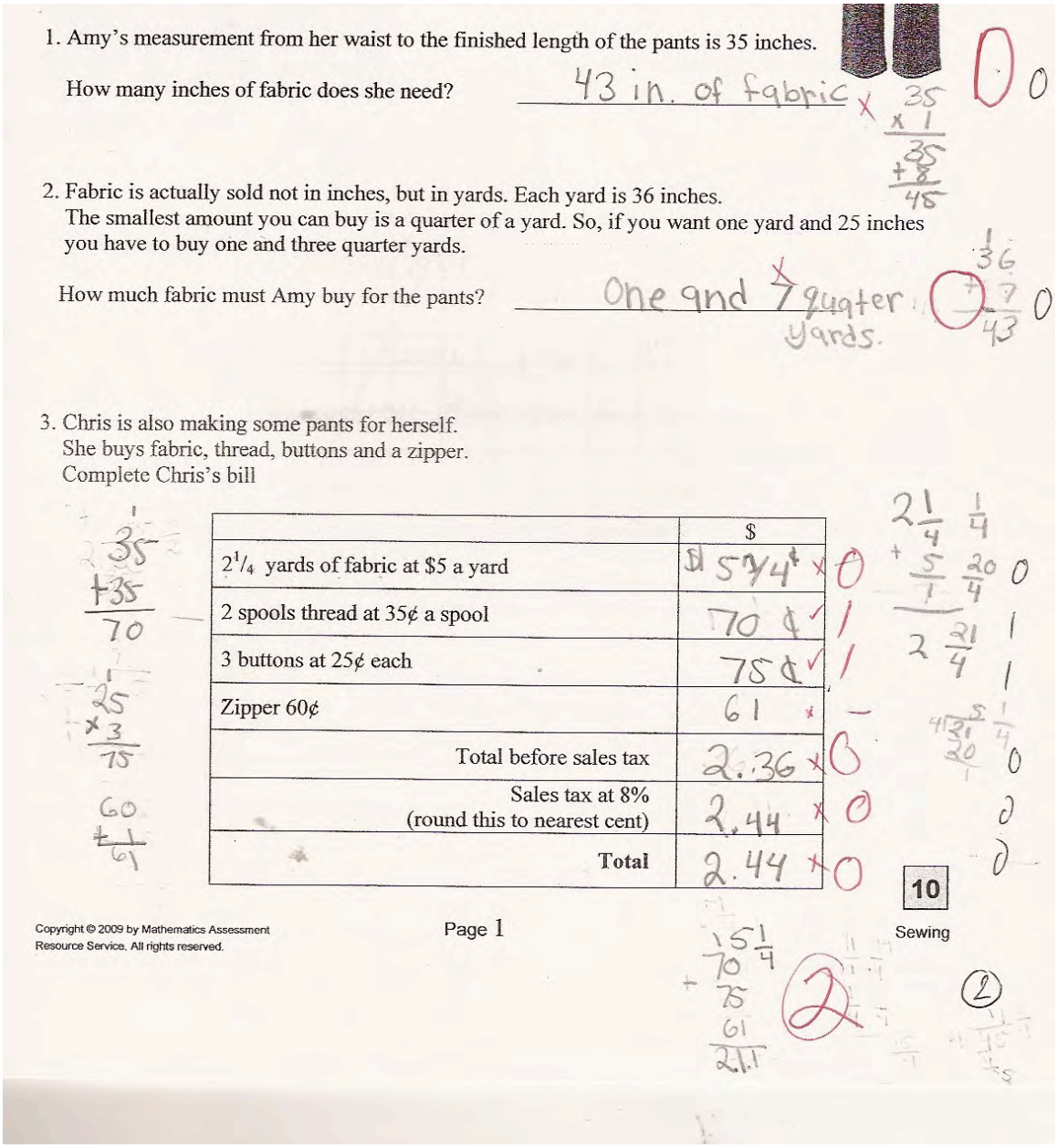
3. Chris is also making some pants for herself.
   She buys fabric, thread, buttons and a zipper.
   Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	5
2 spools thread at 35¢ a spool	30¢
3 buttons at 25¢ each	5
Zipper 60¢	65¢
Total before sales tax	10.50
Sales tax at 8% (round this to nearest cent)	$9.10¢
Total	$9.10¢

10

Student J has lots of partially learned ideas about fractions. *Why do you think the student uses 7 quarter yards? What might she be thinking?* Now look at the right margin and see all the steps that lead to the 5 1/4. *What type of help does this student need?*

Student J



1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

How many inches of fabric does she need? 43 in. of fabric

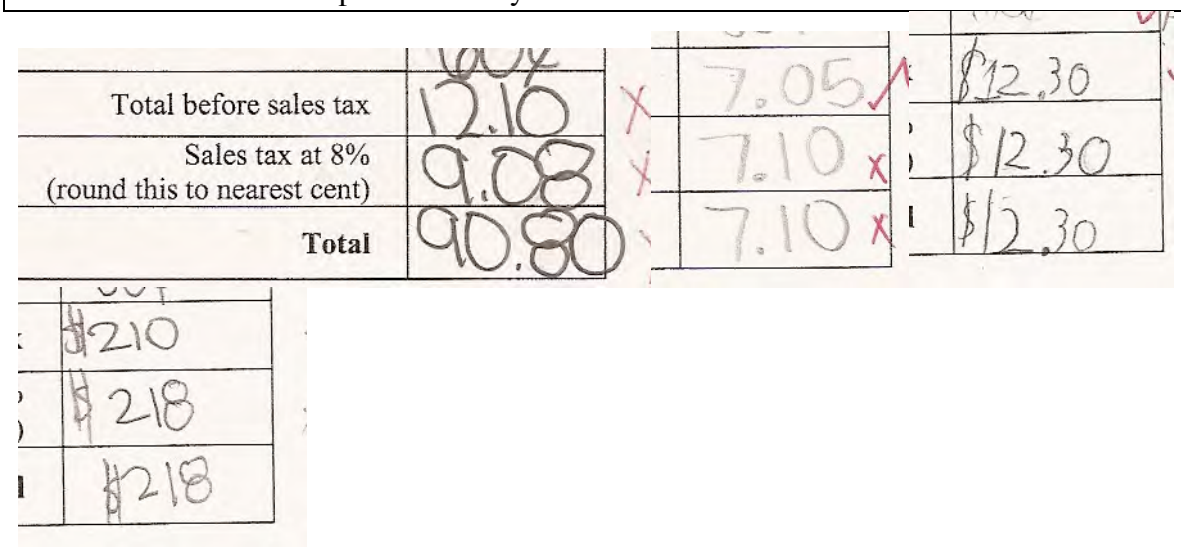
2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.
The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

How much fabric must Amy buy for the pants? One and 7 quater yards.

3. Chris is also making some pants for herself.
She buys fabric, thread, buttons and a zipper.
Complete Chris's bill

	$
$2\frac{1}{4}$ yards of fabric at $5 a yard	$5 1/4
2 spools thread at 35¢ a spool	70 ¢
3 buttons at 25¢ each	75 ¢
Zipper 60¢	61 ¢
Total before sales tax	2.36
Sales tax at 8% (round this to nearest cent)	2.44
Total	2.44

At this grade level, students should be able to use mental math to make estimates of the size of tax. 8% is close to 10%. Ten percent is easy to think about. Look at the work of students below:



Total before sales tax	12.10
Sales tax at 8% (round this to nearest cent)	9.08
Total	90.80

What opportunities do students have to do mental arithmetic in your class?
How does this help build their calculation ability and problem-solving instincts?

6th Grade Task 1 Sewing

Student Task	Use mathematics in a real situation. Reason about measurement in context. Make sense of constraints, such as minimum amount. Think about remainder in a context.
Core Idea 1 Number and Operation	**Understand number systems, the meanings of operation, and ways of represent numbers, relationships, and number systems.** • Understand the meaning and effects of operations with fractions and decimals. • Understand fractions, decimals, and percents as parts of unit wholes and as parts of a collection. • Recognize and generate equivalent forms of commonly used fractions, decimals, and percents. • Understand the meaning of remainders by modeling division problems.
Core Idea 4 Geometry and Measurement	• Understand such attributes as length, area, weight, volume, and angle size and select the appropriate type of unit for measuring each attribute.

Mathematics of the task:

- Interpret and use a rule
- Convert from one unit of measure to another (linear measures and money)
- Round to a quarter unit or round to the nearest cent
- Understand the constraint of only sold in quarter yards
- Multiply with fractions and decimals
- Calculate percents
- Evaluate reasonableness of calculations

Based on teacher observations, this is what sixth graders know and are able to do:

- Add and multiply

Areas of difficulty for sixth graders:

- Finding percentages
- Rounding decimals and rounding to quarter-yards
- Converting inches to yards and cents to dollars
- Estimating reasonable answers for 8% of a number
- Multiplying fractions

MARS Test Task 1 Frequency Distribution and Bar Graph, Grade 6

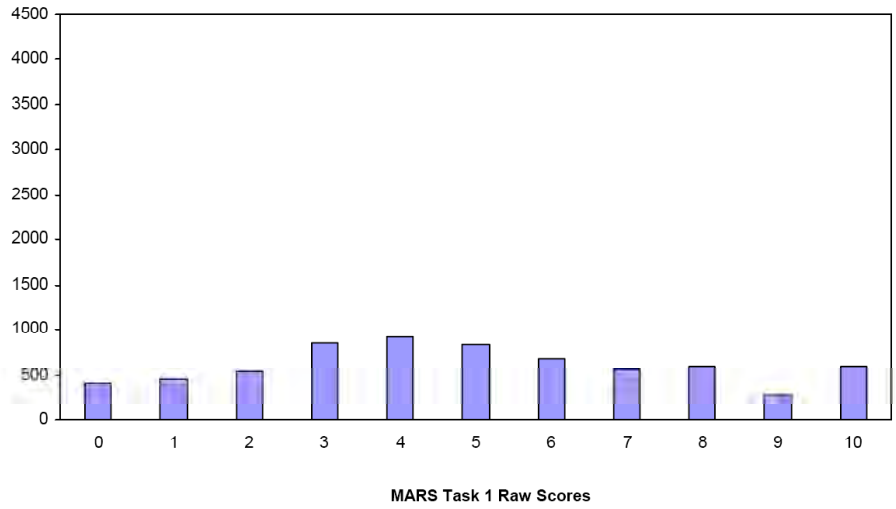
Task 1 - Sewing

Mean: 4.94 StdDev: 2.85

Table 30: Frequency Distribution of MARS Test Task 1, Grade 6

Task 1 Scores	Student Count	% at or below	% at or above
0	415	6.2%	100.0%
1	454	12.9%	93.8%
2	535	20.9%	87.1%
3	853	33.6%	79.1%
4	912	47.2%	66.4%
5	824	59.5%	52.8%
6	681	69.6%	40.5%
7	566	78.1%	30.4%
8	598	87.0%	21.9%
9	283	91.2%	13.0%
10	591	100.0%	8.8%

Figure 39: Bar Graph of MARS Test Task 1 Raw Scores, Grade 6



The maximum score available for this task is 10 points.
The minimum score needed for a level 3 response, meeting standard, is 5 points.

Most students, 94%, could interpret and use the rule to find the length of fabric needed for the pants. Many students, about 79%, could use multiplication to find the cost of thread and buttons, and total their answers for the purchased items. About 53% could find the length of fabric in inches, find the cost of thread and buttons, total their answers, and add their answers with their tax to get a grand total. A few students, 22%, could multiply by a percent to find an 8% tax and round to the nearest cent. Almost 9% could meet all the demands of the task including converting from inches to yards and rounding to the nearest quarter-yard. 6% of the students scored no points on this task. All of the students in the sample with this score attempted the task.

Sewing

Points	Understandings	Misunderstandings
0	All the students in the sample with this score attempted the task.	Students struggled with using the rule to find the amount of fabric. 9% of the students did not double in part 1 (answer 43). 5% did not add the 8 in part 1.
1	Students could interpret a rule and use it to find the amount of fabric needed.	Students struggled with calculations in filling out the bill of sale. In finding the cost of thread 10% did not multiply by 2. In finding the cost of buttons, 10% did not multiply by 3.
3	Students could find cost of thread, buttons, and total their values for fabric, thread, buttons, and zipper.	
5	Students could find cost of thread, buttons, and total their values for fabric, thread, buttons, and zipper. Students also could find the fabric length in inches.	Students struggled with calculating and rounding tax. 11% did not attempt to compute tax. 5% rounded $1.064 to $1.10. 5% thought the tax was 8 cents or $8. 13% had tax values higher than the cost of goods. 15% had tax values equal or close to the cost of goods. Answers ranged from 1 cent to $218. 5% had an answer of $108. Students also struggled with multiplying 2 1/4 times $5. 18% had an answer of $10.25. 12% had an answer of $5. 5% had an answer of $10. 4% did not attempt this part of the task.
8	Students could find cost of thread, buttons, and total their values for fabric, thread, buttons, and zipper. Students also could find the fabric length in inches. Students could multiply 2 1/4 by $5, calculate an 8% tax, and add their subtotal and tax to get a final total.	Students struggled with converting inches to yards and rounding to quarter-yards. 7% got an answer of 2 1/6 yards. 5% had an answer of 61 yards. 4% got 2 1/2 yard. Another 4% got 1 1/4 yards. Other common answers were 78 and 2 yards.
10	Students could convert units of measure for length and money and round appropriately. Students could use multiplication to find the cost of buying multiple amounts of something and find the tax. Students could total answers to find the total for the sale.	

Implications for Instruction

Students need more experience working with following simple arithmetic rules like double a number and add something. Students should be flexible working between multiple representations, such as words or verbal rules, number sentences, and making algebraic expressions.

Students should be comfortable converting inches into yards and inches. More importantly, students should be able to understand and explain the logic of conversions between any sets of measures. Tasks that push at this logic of conversion include 2002 7th grade Leaky Faucet and 2003 7th grade Yogurt.

Students should be able to work with a receipt to find the total cost of buying 2 or 3 items. Students should have an understanding that tax is less than the total cost of an item and be able to calculate the amount of tax by multiplication of decimals or by using benchmark percents.

Some students had difficulty working with multiplying by fractional amounts, 2 1/4 times 5. For students at this grade level this should be a mental math activity. Students should have frequent opportunities to do number talks with skills appropriate to their grade level. Exposure to multiple models helps students develop strategies for thinking about or picturing fractions in their mind.

Ideas for Action Research

Re-engagement – Confronting misconceptions, providing feedback on thinking, going deeper into the mathematics. *(See overview at beginning of toolkit).*

1. Start with a simple problem to bring all the students along. This allows students to clarify and articulate the mathematical ideas.
2. Make sense of another person's strategy. Try on a strategy. Compare strategies.
3. Have students analyze misconceptions and discuss why they don't make sense. In the process students can let go of misconceptions and clarify their thinking about the big ideas.
4. Find out how a strategy could be modified to get the right answer. Find the seeds of mathematical thinking in student work.

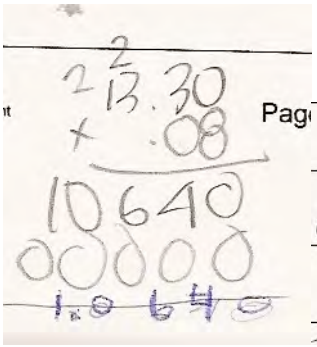
In planning a re-engagement lesson on this task, I think I would also push for students to make some generalizations that would help them in other tasks. I would start by having them look at the rule and ask them reasons why making pants would have that type of rule. What might be reasons for doubling the length from the waist to the bottom of the pants? What might the extra 8 inches be used for? I want students to start thinking of these rules as making sense and leading to formulas to prepare them for algebraic thinking. Students don't have enough experience with measuring, so I might even have them find the amount of fabric they would need to make pants. Definitely I would want them to try and find an algebraic expression for finding the fabric needed to make pants for any height of person. Work with colleagues to decide how you might pose these questions.

Next I would have them discuss why the store might want to round the amount of fabric to the nearest "quarter yard". "*Will rounding ever go down? Why or why not? How large are the quarter yards? My teenage neighbor Alexander just got a job at Beverly's Fabrics, can you make a chart to help him know how to round?"*

In finding the cost of fabric in the receipt, I would now want students to confront some misconceptions so I would pick some pieces of student work to get students thinking about the meaning of multiplying by a mixed number. For example, I might say, "*Alexander was trying to find the cost of the fabric. He said that 2 1/4 times $5 was $10.25. How do you think he got that answer?"* I want students to look at the logic of the misconception and then discuss what Alexander did incorrectly.

I think many students don't understand the format of the sales receipt. So I might say, "*Alexander is confused by the receipt, but is afraid to ask his boss. He wants to know why there are two totals. What would you tell him?"*

Next I want them to think about finding tax. I might use the work of Student B to pose a question:



Total before sales tax	$13.30
Sales tax at 8% (round this to nearest cent)	$1.10
Total	$14.40

"*This is how Alexander found the tax. What was he doing?"*
After students have had a chance to discuss the process. I might follow up with a question to see if they think Alexander is correct or not.
Next, I might have students look at work of Student C:

Total before sales tax	$13.30
Sales tax at 8% (round this to nearest cent)	$11.00
Total	$24.30

Page 1 $13.30 x .8 = 10.64

"*Tabitha tried to help Alex. This is what she did. What was she thinking? Where did her numbers come from?"* I want students to notice that the decimal comes in the wrong place. I am hoping they will bring up ideas about logical size or estimation to find the amount of tax.

Finally I might show the work of Student D:

Total before sales tax	$12.30
Sales tax at 8% (round this to nearest cent)	$0.08
Total	$12.38

This is the work of Larry. What advice would you give to Larry to help him understand what he did wrong?

Either here or after the work of Tabitha, depending on student responses about logical size of numbers, I might want to give some totals and have students estimate the size of the tax.

Now look at the work of your students or other work in the toolkits. Discuss the lesson with colleagues. Are there some other important ideas that you want students to look at? What snippets of student work might you use to pose further questions for students? What are the big mathematical ideas you might want students to walk away with at the end of the lesson? What kind of new task could you pose to see what students have learned from the lesson? What kind of reflection question might you ask at the end of the lesson to get students to think about the mathematics they have discussed?